CLAIMS

1. A seat belt retractor including a take-up drum (2) with webbing (6) wound therearound, the take-up drum (2) being rotatably urged in a direction in which the webbing (6) is wound up, a torsion bar (4) fitted by insertion in the take-up drum (2) and having a first end coupled to a first end of the take-up drum (2) non-rotatably relative thereto, a ratchet wheel (5) coupled to a second end of the torsion bar (4) non-rotatably relative thereto, an emergency locking member (19) operative, in the event of a vehicle emergency, to be locked to the ratchet wheel (5) to stop the rotation of the ratchet wheel (5), thereby stopping the rotation of the take-up drum (2) in a direction in which the webbing (6) is paid out, the torsion bar (4) being twistingly deformed when the webbing (6) is further paid out after the emergency locking member (19) is locked, said seat belt retractor comprising:

a cylindrical sun element provided on a second end of said take-up drum (2) and rotating integrally with the take-up drum (2); an internal tooth element (8) provided near the second end of said torsion bar (4) non-rotatably relative to the torsion bar (4) and having an inner peripheral surface opposed to and spaced apart from an outer peripheral surface of said sun element, one of the outer peripheral surface of the sun element and the inner peripheral surface of the internal tooth element (8) being a gear surface, the other being formed by a deformable member (7); and at least one planet gear (13) established non-rotatably relative to said torsion bar (4), said planet gear (13) being assembled in mesh with said gear surface and in engagement with said deformable member (7) opposed to said gear surface, wherein the planet gear (13) revolves around the deformable member (7) while biting into the surface of the deformable member (7) to plastically deform the deformable member (7) when the webbing (6) is paid out to cause the sun element and the

internal tooth element (8) to rotate relative to each other after said emergency locking member (19) is locked.

2. The seat belt retractor according to claim 1, wherein the depth of bite (L) of said planet gear (13) into said deformable member (7) is less than the length (S) of a gap between the surface of the deformable member (7) and the root of teeth (13a) of the planet gear (13).

3. The seat belt retractor according to claim 1, wherein the deformable member (7) is formed so that the area of said plastic deformation gradually decreases in a direction of movement of the planet gear (13) from a position in which the planet gear (13) is assembled to said deformation member (7).

4. The seat belt retractor according to claim 2, wherein the deformable member (7) is formed so that the area of said plastic deformation gradually decreases in a direction of movement of the planet gear (13) from a position in which the planet gear (13) is assembled to said deformation member (7).

5. The seat belt retractor according to claim 1, wherein said deformation member (7) is provided with a projecting positioning pin (10), and said one of said sun element and said internal tooth element (8) having said gear surface is provided with an engagement hole (11), the engagement hole (11) being engaged by said positioning pin (10) when in an assembled position.

6. The seat belt retractor according to claim 2, wherein said deformation

member (7) is provided with a projecting positioning pin (10), and said one of said sun element and said internal tooth element (8) having said gear surface is provided with an engagement hole (11), the engagement hole (11) being engaged by said positioning pin (10) when in an assembled position.

7. The seat belt retractor according to claim 3, wherein said deformation member (7) is provided with a projecting positioning pin (10), and said one of said sun element and said internal tooth element (8) having said gear surface is provided with an engagement hole (11), the engagement hole (11) being engaged by said positioning pin (10) when in an assembled position.

8. The seat belt retractor according to claim 4, wherein said deformation member (7) is provided with a projecting positioning pin (10), and said one of said sun element and said internal tooth element (8) having said gear surface is provided with an engagement hole (11), the engagement hole (11) being engaged by said positioning pin (10) when in an assembled position.

9. The seat belt retractor according to claim 1, wherein each tooth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

10. The seat belt retractor according to claim 2, wherein each of the teeth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

11. The seat belt retractor according to claim 3, wherein each tooth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

12. The seat belt retractor according to claim 4, wherein each of the teeth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

13. The seat belt retractor according to claim 5, wherein each tooth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

14. The seat belt retractor according to claim 6, wherein each of the teeth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

15. The seat belt retractor according to claim 7, wherein each tooth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.

16. The seat belt retractor according to claim 8, wherein each of the teeth (13a) of the planet gear (13) is formed in a trapezoidal configuration with a gradually decreasing width from the root of each tooth (13a) toward the top thereof.